

REMARKS

This is in response to the Office Action of August 3, 2009. A previous corrective insertion into the specification is reversed. Claims 4 and 12-16 are cancelled, without prejudice. Claims 1, 5, 6, 8, and 17 are amended to more particularly point out and distinctly claim the invention. Support for amendments to the foregoing claims is discussed hereinbelow. Basis for new claim 19 may be found in the specification, for instance in the second paragraph on page 8 and in the first full paragraph on page 19. No new matter is introduced by this Amendment. Claims 1-3, 5-11, and 17-19 are now pending in the application.

Amendment to claim 6

The terminology "4 to 12 carbon atoms" (second occurrence) in original claim 6 is an error, which is corrected to "2 to 10 carbon atoms" in claim 6 as amended hereinabove. The error was due to a mistranslation of underlying PCT/JP2004/012660. Enclosed is a copy of page 50 of PCT/JP2004/012660 along with a verified translation supporting the amendment.

Objection to specification

On page 3 of the Office Action, objection is raised to the June 10, 2009 amendment of the specification as allegedly introducing new matter therein. Applicants do not agree that the change in question constitutes new matter. However, the present Amendment deletes the name "methyltriphenoxysilane" which had been added to the specification in the Amendment filed June 10, 2009. The name "methyltrimethoxysilane" has not been added back in its place, since that name is believed to be the result of a translation error.

Alleged indefiniteness and lack of sufficient enablement

Claims 1-11, 17, and 18 were rejected under the first paragraph of 35 U.S.C. § 112 as exceeding the scope of the enabling disclosure. Office Action, pages 3-4. Claims 1-11, 17, and 18 were rejected under the first paragraph of 35 U.S.C. § 112 as failing to comply with the written description requirement. Office Action, page 4. Claims 1-11, 17, and 18 were also rejected under the second paragraph of 35 U.S.C. § 112 as failing to define the invention

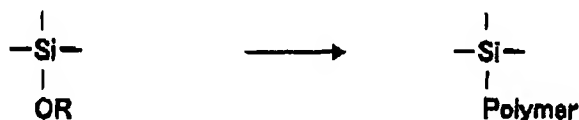
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properly. Office Action, page 5. The claims have been amended to remove the issues raised by the Examiner in this connection. A detailed discussion follows.

One aspect of these rejections as to the form of the claims had to do with the recitation in the claims of "such that" terminology. That terminology no longer appears in the claims of this application. Preferred embodiments of the functional groups<sup>1</sup> capable of reacting with active metals in the present claims are now expressly recited in the claims, based upon such disclosure as that in the paragraph bridging pages 11-12 of the specification. When each of these functional groups in the polyorganosiloxane are reacted with an active metal at a terminal of the active conjugated diene polymer chains, a part of the functional groups are varied but the remainder part of the functional groups remain unreacted.

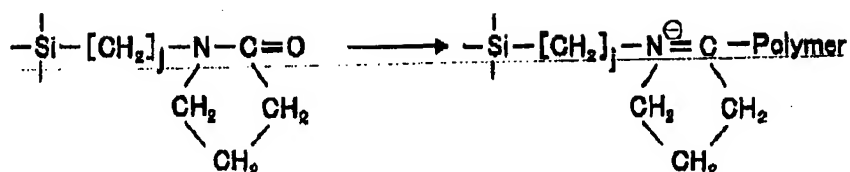
More specifically, in the case when the functional group is an alkoxyl group having 1 to 5 carbon atoms and when said alkoxyl group is reacted with an active metal at a terminal of the active conjugated diene polymer chains, the bond between a Si atom and an oxygen atom is cleaved whereby the active conjugated diene polymer chain is directly bonded to the Si atom to form a single bond (specification, page 13, third paragraph). The term "single bond" as used herein means a state in which the active conjugated diene polymer chain is directly bonded to the Si atom. This reaction is expressed by the reaction scheme



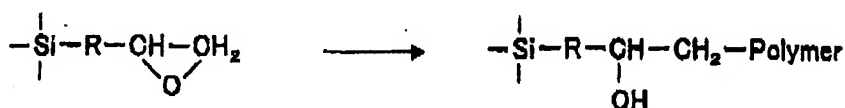
wherein R is an alkyl group having 1 to 5 carbon atoms.

In the case when the functional group is a hydrocarbon group having a 2-pyrrolidonyl group, and when said hydrocarbon group is reacted with an active metal at a terminal of the active conjugated diene polymer chains, the carbon-oxygen bond in the carbonyl group of 2-pyrrolidonyl group is cleaved to form a structure such that the active conjugated diene polymer chain is directly bonded to the carbon atom (specification, page 13, fourth paragraph). This reaction is expressed by the following reaction scheme.

<sup>1</sup> For instance, an alkoxyl group having 1 to 5 carbon atoms, a hydrocarbon group containing a 2-pyrrolidonyl group, or an epoxy-containing group having 4 to 12 carbon atoms.



In the case when the functional group is an epoxy-containing group having 4 to 12 carbon atoms, and when this epoxy group-containing C<sub>4-12</sub> group is reacted with an active metal at a terminal of the active conjugated diene polymer chains, the carbon-oxygen bond in the epoxy group is cleaved to form a structure such that the active conjugated diene polymer chain is bonded to the carbon atom (specification, paragraph bridging pages 13 and 14). This reaction is expressed by the following reaction scheme.



Thus, the values X<sup>1</sup> and X<sup>4</sup> in claims 1 and 17 are defined as follows in currently amended claims 1 and 17 (emphasis added):

(i) a part of the sum of X<sup>1</sup> and X<sup>4</sup> is a functional group selected from the group consisting of a hydrocarbon group containing a 2-pyrrolidonyl group and an epoxy-containing group having 4 to 12 carbon atoms and the remainder of the sum of X<sup>1</sup> and X<sup>4</sup> is a group derived from said functional group by the reaction of said functional group with an active metal at a terminal of the active conjugated diene polymer chains, or (ii) a part of the sum of X<sup>1</sup> and X<sup>4</sup> is an alkoxyl group having 1 to 5 carbon atoms and the remainder of the sum of X<sup>1</sup> and X<sup>4</sup> is a single bond, or (iii) X<sup>1</sup> and X<sup>4</sup> are an alkyl group having 1 to 6 carbon atoms or an aryl group having 6 to 12 carbon atoms, X<sup>1</sup> and X<sup>4</sup> being the same or different.

In amended claims 1 and 17, the "functional groups" have been specifically limited to the above-mentioned three groups, and the reactions of these functional groups have been specifically described. Therefore, the recitation of said functional groups in the claims as amended – and, in particular, the language "a group derived from said functional group by the reaction of said functional group with an active metal at a terminal of the active conjugated diene polymer chains" – are believed to be clear, definite, fully supported in the written description of the invention, and fully enabled by the disclosure in the specification.

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In the last paragraph on page 4 of the Office Action, the Examiner contends that it is unclear what basis exists in the specification correspond to the claimed listing of embodiments in component (B) in claim 1 and claim 17 as amended in the Amendment filed May 18, 2009. Applicants submit that the basis for the listings incorporated into claim 1 and claim 17 are found on pages 17-19 of the specification. Enclosed herewith are copies of pages 17-19 of the specification, marked up to show basis for each embodiment in the listings.

Applicants respectfully submit that each of claims 1-3, 5-11, and 17-19 currently pending herein satisfies the requirements of the first and second paragraphs of 35 U.S.C. § 112. Withdrawal of the rejections are requested.

Prior art rejection

Claims 1-11, 17, and 18 were rejected under 35 U.S.C. § 103(a) as being unpatentable over US 6,767,969 B2 (Sasagawa) in view of US 4,657,965 (Watanabe). Office Action, pages 6-7. The rejection is respectfully traversed.

Sasagawa discloses a hydrogenated polymer obtained by hydrogenating a conjugated diene polymer. Sasagawa teaches that the conjugated diene polymer may be a terminal-modified conjugated diene that may have carboxyl, carbonyl, amido, thiocarbonyl, acid halide, acid anhydride, amino, pyridyl, epoxy and other functional groups. Column 6, lines 4-27. One difference between the instantly claimed conjugated diene rubber and the hydrogenated polymer disclosed in Sasagawa is that the present reaction product (B) of a conjugated diene rubber with a compound having a specific functional group in the instantly claimed conjugated diene rubber composition is not a hydrogenated polymer. Another difference is that Sasagawa fails to teach the polyorganosiloxane bonded conjugated diene rubber (B) in the instantly claimed conjugated diene rubber composition, as acknowledged by the Examiner. Thus, Sasagawa suggests nothing about the instantly claimed conjugated diene rubber composition.

The Examiner's position, expressed on page 6 of the Office Action, that Sasagawa's disclosure in column 9 that his materials "can be used as food packaging materials, medical equipment materials, domestic appliances and parts therefore, materials for automobile parts, industrial parts, utensils, toys, etc., materials for footwear, materials for adhesives, asphalt modifiers, and the like" teaches use in tires is unreasonable. A person of ordinary skill in the art

would not be directed by the foregoing list to use the Sasagawa materials in automobile tires.

Watanabe discloses silicone elastomer compositions comprising polyorganosiloxanes, inorganic fillers, and vulcanizers. Watanabe teaches that the polyorganosiloxanes have organic groups, at least two of which are monovalent hydrocarbon groups possessing at least five carbon atoms and a carbon-carbon double bond bonded to a silicon atom via at least one carbon atom. Column 2, lines 15-47.

One difference between the present invention and Watanabe lies in that the polyorganosiloxane in Watanabe differs significantly from the conjugated diene rubber (A) in the instantly claimed conjugated diene rubber composition. The polyorganosiloxane having said at least two monovalent hydrocarbon groups in Watanabe is prepared by adding, to a polyorganosiloxane, a non-conjugated diene such as 5-ethylidene-2-norbornene, 5-methylene-2-norbornene, dicyclopentadiene, or 1,4-hexadiene. Column 2, line 60 to column 3, line 5. The monovalent hydrocarbon groups derived from these non-conjugated dienes have one carbon-carbon double bond. In contrast, the conjugated diene rubber (A) in the instantly claimed conjugated diene rubber composition has at least three conjugated diene polymer chains bonded to silicon atoms. Applicants' conjugated diene rubber (A) is produced by the reaction of conjugated diene polymers with a polyorganosiloxane, and each conjugated diene polymer chain has many carbon-carbon double bonds. The number of carbon-carbon double bonds is equal to the degree of polymerization. Watanabe suggests nothing about conjugated diene polymer chains bonded to silicon atoms of polyorganosiloxane.

Due to its conjugated diene polymer chains bonded to silicon atoms of a polyorganosiloxane, conjugated diene rubber (A) in the instantly claimed conjugated diene rubber composition has the characteristics of a conjugated diene rubber. Thus, the instantly claimed conjugated diene rubber composition also has characteristics of a conjugated diene rubber. For this reason, a rubber vulcanizate thereof may be used to make tires. Specification, page 63, section headed "Industrial Applicability." In contrast, the silicone elastomer composition of Watanabe is used for tubes, products of profile extrusion, packings, and gaskets. Watanabe, column 16, lines 33-36. The silicone elastomer composition of Watanabe is not disclosed to have properties making it suitable for the manufacture of tires.

To sum up, both Sasagawa and Watanabe are silent on both the conjugated diene rubber (A) and the reaction product (B) of a conjugated diene rubber with a compound having a functional group. Furthermore, neither of Sasagawa and Watanabe teaches or suggests anything about a rubber composition capable of being used for tires. Applicants submit that it is unexpected that the instantly claimed conjugated diene rubber composition provides a vulcanizable rubber composition having an improved processability when silica is incorporated therein, and the vulcanizable rubber composition gives a rubber vulcanizate having significantly reduced heat build up, enhanced wet-grip properties, and high abrasion resistance – making it particularly suitable for the manufacture of tires.

There is no motivation of combining Sasagawa with Watanabe, and, the instantly claimed conjugated diene rubber composition is not obvious over the hypothetical combination of Sasagawa with Watanabe. That is, even if the Watanabe disclosure is combined with the Sasagawa disclosure, the subject matter of claims 1-11, 17 and 18 is not obvious from that hypothetical combination of references. Withdrawal of the rejection of record is in order and is earnestly solicited.

Contact information

If there are any questions concerning the present application, the Examiner is respectfully requested to contact Richard Gallagher, Registration No 28,781, at (703) 205-8008.


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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Dated: November 2, 2009

Respectfully submitted,

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